

REMARKS/ARGUMENTS

These remarks are filed in response to the Office Action dated July 21, 2006. No amendments are made by way of this submission. The Examiner made the current Office Action Final. In view of the fact that the present response is being filed within two months of the mailing date of the Office Action, the Applicants respectfully submit that no fees are due in the connection with this submission. In the event the Applicants are mistaken, the Commissioner is hereby authorized to deduct any required fees and, in particular, any fees due under 37 C.F.R. § 1.17(a) in connection with this and future replies.

In view of the previous response by the Applicants, the Examiner withdrew his rejections under 35 U.S.C. § 101 and his rejections under 35 U.S.C. § 102 based upon the Soemo reference. The Examiner maintained his rejection of all pending claims under 35 U.S.C. § 102(e) as being anticipated by the Parker reference. The Applicants have carefully considered the Examiner's rejection, as clarified by the Examiner's "Response to Arguments" set out in paragraph 7 of the Office Action, but the Applicants respectfully disagree with the Examiner's interpretation of the claim language in the present application and the Examiner's position with respect to the contents and teachings of Parker. For the reasons set out below, the Applicants respectfully request that the Examiner reconsider his position and withdraw his rejection based upon Parker.

The present application

The present application is directed to a memory device or data structure stored within a memory device that is divided into a static volume and a dynamic volume. Each of the volumes includes a plurality of blocks and each of the blocks includes a plurality of sectors. As noted in the background portion of the present application, a

problem with flash memory-type devices is that new data cannot be written to a sector without erasing an entire block and re-writing the entire block. A problem that arises in connection with this aspect of flash memory is that if the system loses power during the erase-write procedure, all of the data within the block may be corrupted and/or lost.

Conventional file systems, such as DOS or Unix file systems, rely upon metadata, such as inodes, to store information regarding data files, such as file size and last modification time. If a block of memory contains a dense quantity of metadata, then the loss of that data during an interrupted erase-write operation can be catastrophic for the overall file system.

Accordingly, the present invention proposes that the memory device be divided into a static volume and a dynamic volume, wherein the dynamic volume relates to data that is more frequently updated or changed as compared to the static volume. Within the dynamic volume, each of the dynamic blocks have one sector allocated for metadata and the remaining sectors allocated for regular data. The static blocks may include multiple sectors for metadata with the remaining sectors available for regular data.

Claim construction

In construing the claims for the purpose of prosecution, the Examiner is entitled to adopt the "broadest reasonable interpretation" of the claim language. However, the Applicants respectfully remind the Examiner that the "broadest reasonable interpretation" is to be consistent with the plain meaning of the claim language except insofar as the specification provides clear definitions for terms appearing in the claims. Moreover, the "broadest reasonable interpretation" must be consistent with the interpretation that those skilled in the art would reach. MPEP 2111.

The term "block" in association with flash memory is well understood to refer to the smallest portion of memory erasable at one time. This is consistent with the manner in which the term block is used in the specification. For example, reference may be made to paragraph [0003].

The term "sector" in the context of flash memory refers to the smallest portion of memory that is readable/writable at one time. Again, this term is well understood in the art and is used in this manner consistently throughout the specification. Reference may be made to paragraph [0003].

Moreover, the foregoing meanings for the terms "block" and "sector" are consistent with the manner in which these terms and concepts are used in the Parker reference.

Accordingly, the Applicants respectfully submit that the only reasonable interpretation of these claim terms must be consistent with the definition given above. The Applicants respectfully disagree with the Examiner's suggestion that he can interpret a block as any arbitrary collection of sectors, or interpret a "data item" as equivalent to a block, or interpret a "record" as a block.

Parker

The Parker reference relates to a log-structured file system and flash memory. Log-structured file systems operate on the principle that new data or updated files are appended to the end of the log, hence the depiction in Figures 3, 4, and 5 of a "circular" memory. When a record is updated in log-structured file system, the updated record is appended to the end of the log and the previous version of the record earlier in the log is designated as inactive by switching a validity bit from a

one to a zero, which can be accomplished without wholly re-writing the earlier record. One of the problems that arises when using flash memory is the fact that erase operations may only be performed on blocks of memory, whereas read and write operations may be performed at a more fine-grain level on sectors.

The innovations described by Parker include performing a clean-log operation to free-up additional space in the oldest portion of the log. Because erase operations must be performed on a block-sized portion of memory, any records found within an erase block that remain active are copied and appended to the end of the log before performing the erase operation. This allows the memory to consolidate records in an effort to maximize use of the available flash memory.

At column 8, lines 37-44 and at column 11, lines 9-17, Parker suggests that the memory may contain more than one log, and that one of the logs may relate to relatively volatile data records that change rapidly (the "hot" log) and that one of the logs may contain relatively stable records (the "cold" log). Parker does not go on to suggest that these logs would be treated any differently or that either of these logs would have particular sectors allocated for metadata or any other type of data.

Nowhere does Parker discuss the issue of allocating a sector within an erase block for a particular type of data. Given that Parker relates to log-structured file systems, he is not concerned with the issue of metadata records versus other data. The Parker reference provides no teaching on this point.

Claim rejections

In the Response to Arguments section in paragraph 7 of the Office Action, the Examiner argues that Parker teaches the claim limitations in several ways. First, the Examiner argues that Parker teaches multiple logs and that each log reads on the

claimed block, since the block is an arbitrary collection of sectors. For the reasons set out above, the Applicants respectfully submit that this interpretation of the claim language is unreasonable and unsupportable.

Putting the Examiner's rejection on its best footing, the Applicants acknowledge that Parker's teaching of "hot" and "cold" logs is similar to the claimed dynamic and static volumes in the independent claims of the present application. However, Parker fails to disclose a dynamic volume containing a plurality of dynamic blocks in which each of the dynamic blocks has one of its sectors allocated for writing and reading metadata and the remaining sectors allocated for other data. Parker never suggests the hot and cold logs would be configured or administered any differently. The Examiner argues that "a version of a data item reads on the claimed block". This in no way provides a teaching that the dynamic blocks within a dynamic volume would have one sector allocated for metadata and the remaining sectors allocated for other data. Parker provides no teaching or suggestion in connection with the allocation of particular sectors within a block.

In paragraph 3 of the Office Action, the Examiner suggests that item 56 of Figure 4 constitutes a sector containing a version number. In fact, at column 10, Parker refers to item 56 as a record, which the Examiner acknowledges may be of variable length. There is no suggestion in Parker that item 56 constitutes a sector.


The Examiner goes on to speculate, with a liberal application of hindsight analysis, that a given record (e.g., an email) might happen to be one block in size and may have metadata (e.g., a header) that happens to occupy one sector. First, Parker provides no teaching regarding such a record having these characteristics. The suggestion that a variable length record could happen to occupy one block and may result in a sector containing metadata is pure speculation on the part of the Examiner. The Examiner's speculation cannot serve as the basis for an anticipation

rejection. Second, even if such a record were, through happenstance, to have come into existence, it does not result in a memory device having a static volume and a dynamic volume, wherein each of the dynamic blocks in the dynamic volume have one sector allocated for writing and reading metadata and the remaining sectors available for writing and reading other data. In the Applicants' respectful submission the rejection based on Parker is improper and ought to be withdrawn.

In view of the foregoing submissions, the Applicants respectfully request reconsideration and allowance of the present application. Should the Examiner have any questions with regard to these submissions, please contact the Applicants' agent, Fraser Rowand, at 416-868-1482.

Respectfully Submitted,

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